

New combinations for two species of *Spyridium* (Rhamnaceae: Pomaderreae) from the Grampians, Victoria

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Abstract

Recent molecular and morphological studies on Australian Rhamnaceae have revealed that two species of *Trymalium* Fenzl endemic to the Victorian Grampians are misplaced in the genus and should be transferred to *Spyridium* Fenzl. Two new combinations, *Spyridium daltonii* (F. Muell.) J. Kellerm. and *S. xramosissimum* (Audas) J. Kellerm., are provided. Lectotypes are chosen for both species.

Introduction

Spyridium Fenzl consists of approximately 40 species and occurs predominantly in southern and south-eastern Australia and Tasmania. It is one of the most diverse genera in the Australian Rhamnaceae and is currently being revised for the *Flora of Australia* (W.R. Barker, J. Kellermann, F. Udovicic & N.G. Walsh, in prep.). In Victoria the genus is represented by seven species, most of which also occur in South Australia and/or New South Wales. One species, *Spyridium* sp. 1 *sensu* Walsh (1999a), is very rare and endemic to the Little Desert.

The genus is part of the tribe Pomaderreae Reissek ex Endl., which currently contains approximately 200 species in seven genera (*Blackallia* C.A. Gardner, *Cryptandra* Sm., *Pomaderris* Labill., *Siegfriedia* C.A. Gardner, *Spyridium*, *Stenanthemum* Reissek, *Trymalium* Fenzl). Pomaderreae is characterised by the presence of a stellate indumentum on stems, leaves, and/or flowers. The tribe is endemic to Australia, with one genus (*Pomaderris*) extending to New Zealand. It is described in more detail in Medan and Schirarend (2004) and Kellermann *et al.* (2005).

Phylogenetic analyses of Pomaderreae using nuclear internal transcribed spacer DNA sequences (Kellermann *et al.* 2005) have revealed that two species from the Victorian Grampians that are currently classified as *Trymalium*, namely *T. daltonii* F. Muell. and *T. xramosissimum* Audas, are misplaced in that genus and should be transferred to *Spyridium*. The Queensland species *T. minutiflorum* E.M. Ross was shown to be part of a group of species that includes taxa that were previously not thought to be related (Kellermann *et al.* 2005). This group will eventually be described as a new genus of Rhamnaceae (J. Kellermann, B.L. Rye and K.R. Thiele, in prep.). With the exclusion of these south-eastern Australian species, the genus *Trymalium* will be virtually confined to Western Australia, with one species in South Australia, *T. wayi* F. Muell. & Tate. This paper makes the relevant new combinations and lectotypifications for the Victorian species. Detailed descriptions and distribution maps are given in Walsh (1999b).

Taxonomy

Spyridium daltonii (F. Muell.) J. Kellerm. *comb. nov.* *Trymalium daltonii* F. Muell., *Fragm.* 9: 135 (Sept. 1875), as “*T. Daltoni*”. *Cryptandra daltonii* (F. Muell) F. Muell., *Syst. census Austral. pl.* 60 (1882), as “*C. Daltoni*”. *Type citation*: “In valle Barney’s Gully

montium Grampians perrarum; St. Eloy D'Alton". *Lectotype (here designated)*: Halls Gap, Grampians, 1875, *St E. D'Alton s.n.* (MEL 56063). *Remaining syntypes*: Halls Gap, *St E. D'Alton II* (MEL 56066); Grampians, *St E. D'Alton s.n.* (MEL 56067); Victoria, from the Grampians, *St E. D'Alton s.n.* (MEL 56059, 56060; BM *n.v.*, photo seen).

Common name: Because the common name of the plant, Narrow-leaf *Trymalium*, includes the genus name, a change is desirable. To avoid confusion with the South Australian *S. phylloides* Reissek, which is called Narrow-leaved *Spyridium* (Canning & Jessop 1986), an alternative common name, **Grampians *Spyridium***, is suggested.

Illustrations: G.R. Cochrane, B.A. Fuhrer, E.R. Rotherham and J.H. Willis, *Flowers and plants of Victoria* 48, t.109 (1986), photograph; L. Costermans, *Native trees and shrubs of south-eastern Australia* 222–223 (1981), line drawing and photograph; I.R. McCann, *The Grampians in flower* 98 (1994), photograph; N.G. Walsh and T.J. Entwisle, *Flora of Victoria* 4: 113, t. 19A (1999); M.G. Corriek and B.A. Fuhrer, *Wildflowers of Victoria* 200, t.702 (2000), photograph. All illustrations as *T. daltonii*.

Taxonomic history: Ferdinand von Mueller described *S. daltonii* in 1875 from specimens collected by St. Eloy D'Alton in the Grampians. He placed the species in *Trymalium* and described it as having linear leaves, up to 3/4" (i.e., 1.5 mm) wide, with persistent stipules, cymose inflorescences with few flowers, globular flower buds, a short minutely trilobate style, and petals that contain the anthers.

Generic concepts in Rhamnaceae were very fluid at that time, with anything between two (*Cryptandra* and *Pomaderris*; Hooker 1855) and five genera (*Cryptandra*, *Pomaderris*, *Spyridium*, *Stenanthemum* and *Trymalium*; Bentham 1863) suggested for Pomaderraceae (see also Thiele & West 2004, Kellermann *et al.* 2005). Mueller himself stated on the same page of the *Fragmenta* on which he published the new species that he planned to dispose of two genera, and include *Trymalium* into *Spyridium*, and *Stenanthemum* into *Cryptandra*. Seven years later Mueller followed Hooker and accepted only two genera in Pomaderraceae, assigning all species of *Spyridium*, *Stenanthemum* and *Trymalium* to *Cryptandra* (Mueller 1882). Among the species he transferred to *Cryptandra* was *T. daltonii*.

Subsequent authors, however, accepted the genus *Trymalium* and the Victorian species *T. daltonii* (e.g., Ewart 1931, Willis 1972, Walsh 1999b).

Typification: There are several sheets of *S. daltonii* at MEL that were collected by St Eloy D'Alton, however, the only collection locality given on them is "Halls Gap, Grampians" or "Grampians". Barney's Gully, mentioned by Mueller, refers to Barney Creek, which is located about 8 km south-east of Halls Gap. No specimens with this location were found at K or BM. The lectotype (MEL 56063) is a flowering branch and bears a label in D'Alton's handwriting and a herbarium label by Mueller; it is the only specimen with a collection date.

One of the remaining syntypes (MEL 56067) has a label in Mueller's hand only; another specimen (MEL 56066) has a label by D'Alton with a description of habit and flower colour, in which he also stated "Fruit not procurable yet". This corresponds with Mueller's protologue, in which he writes that fruits are not known for the species. Therefore the fruiting specimen on sheet MEL 56056, which is annotated as "possible syntype", is excluded from the type series.

Three additional sheets (MEL 56059, MEL 56060; BM) have printed labels, and were presumably part of an educational set of plant specimens issued by Mueller.

Notes: In older literature, the epithet is often spelt "D'Altonii" or "d'altonii".

Spyridium xramosissimum (Audas) J. Kellerm. *comb. nov.* = *Spyridium parvifolium* (Hook.) F. Muell. × *S. daltonii* (F. Muell.) J. Kellerm. *Trymalium ramosissimum* Audas, *Vict. Nat.* 38: 35, t. 1 (4 Aug. 1921); name first published in *Vict. Nat.* 37: 136 (7 Apr.

1921). *Trymalium xamosissimum* Audas (pro sp.) sensu J.H. Ross, *Census vasc. pl. Victoria*, 5th edn, 103 (1996). *Type citation*: “Grampians (Mount Difficult), C.W. D’Alton & J.W. Audas”. *Lectotype (here designated)*: Mt. Difficult, Grampians, Oct. 1919, J.W. Audas & C.W. D’Alton s.n. (MEL 56153). *Isolectotypes*: MEL 56154, MEL 56156. *Possible isolectotype*: Grampians 1920 [Oct. 1919], from Audas Feb. 1921 (MEL 688397 ex herb. A.J. Tadgell).

Common name: Two names are currently applied to the species, Broad-leaf *Trymalium* (Ewart 1931) and Branched *Trymalium* (McCann 1994). The suggested common name is **Branched *Spyridium***.

Illustrations: J.W. Audas, *Vict. Nat.* 38: opp. 34, t. 1 (1921), *One of Nature’s Wonderlands* 59–60, t. opp. 59 (1925), *The Australian Bushland* 283–284, t. opp. 283 (1950); L. Costermans, *Native trees and shrubs of south-eastern Australia* 222 (1981); I.R. McCann, *The Grampians in flower* 98 (1994), photograph; N.G. Walsh and T.J. Entwisle, *Flora of Victoria* 4: 113, t. 19B (1999), leaf only. All illustrations as *T. ramosissimum* or *T. xamosissimum*.

Taxonomic history: James W. Audas visited the Grampians once in every year between 1912 and 1922 together with his friend Charles W. D’Alton. He reported about most of these excursions in the *Victorian Naturalist* (Audas 1913; 1914; 1919; 1920; 1921b; 1922). As such, he was very familiar with the Grampians’ flora and also knew Mueller’s *Trymalium daltonii*, which he mentions several times in these articles.

In November 1918 he collected some twigs of *Spyridium xamosissimum* for the first time. The new species was possibly drawn to Audas’ attention by D’Alton, who had collected the species before. There are two sheets of *S. xamosissimum* collected by Charles [W.] D’Alton in the Grampians “prior to 1907” (MEL 56152, 235444). Audas tentatively labeled the 1918 specimen as “*Cryptandra* sp.?”. He then forwarded the material to J.M. Black in Adelaide, who identified it correctly as a *Spyridium* and supplied Audas with a description. The copiously annotated and illustrated sheet is still in Black’s herbarium (AD 97015409: Grampian Mts., Vict., 1 Nov 1918, J.W. Audas s.n.). In a thank-you note to Black from 20 Feb. 1919 (attached to AD 97611150), Audas states: “I have written a paper on my Grampians trip for the Field Naturalists [sic] Journal and hope to include this new *Spyridium*”. The report appeared in the *Victorian Naturalist* on 10 Apr. 1919, however, without the description of the species (Audas 1919).

On their next trip to the Grampians, in October 1919, Audas and D’Alton collected the species at Mt Difficult, but this time they gathered more material. An attempt to collect the species in the following year failed (Audas 1921b). Audas forwarded these specimens to A.J. Tadgell. Two letters from Tadgell to Audas from 8 Feb. and 21 June 1921 are attached to a herbarium sheet (MEL 688397) and give a detailed analysis and compare *Spyridium xamosissimum* with *S. daltonii*. The sheet also contains the reply from Audas dated 8 Feb. 1921, in which he thanks Tadgell for his “careful overhauling of the two specimens” and hoped “in the near future to describe the plant as new to science”. The new species was first presented as an exhibit at a Field Naturalists’ meeting on 14 Mar. 1921 (*Vict. Nat.* 37: 136) and was published in the *Victorian Naturalist* on 4 Aug. 1921 as *Trymalium ramosissimum* (Audas 1921a). Clearly, Audas changed his mind about the generic affinity of the new species between 1919 and 1921. We do not know, whether it was through the influence of Tadgell, who saw the species to be close to *S. daltonii*. It is also uncertain why Audas states that he discovered the species in October 1919 (Audas 1921a, b), even though he had found it the year before.

Curiously, Audas published virtually the same text and illustration in two other books (Audas 1925, 1950), claiming each time that he is describing a “new species”. In his 1950 book he augments it with a Latin diagnosis of the species, as was required by the *Code of Botanical Nomenclature* from 1935 onwards (Greuter *et al.* 2000). When writing the description of *S. ramosissimum* and the points of distinction between the species and *S.*

daltonii for publication, Audas relied heavily on correspondence with A.J. Tadgell and J.M. Black. The Latin diagnosis in Audas (1950) is the same as the one drafted by Black on his herbarium sheet.

Audas regarded the species as being closely allied to *S. daltonii*, mainly differing in having broader and larger leaves with less strongly revolute margins, stipules and bracts being broader in shape as well. He also described the new species to have a more woolly indumentum on the calyx lobes, and more lightly coloured, silky hairs on the stems and leaves.

Leon Costermans first suggested that the species is a hybrid between *S. daltonii* and *S. parvifolium* (Costermans 1981). Plants of *S. xramosissimum* usually grow in the vicinity of both parent species, and apparently do not set viable seed; if fruitlets are present, they are usually from "immature and/or aborted fruits" (Walsh 1999b: 110). The hybrid status of the taxon was formally recognised in Ross (1996).

Two other earlier collections of *S. xramosissimum* exist at MEL: St Eloy D'Alton sent one specimen to Mueller (MEL 56155) with the annotation "Halls Gap, not common". This specimen was presumably the reason for Mueller to amend the description of his *T. daltonii* to include leaves up to 2" (i.e. 4.2 mm) in width in December 1875 (*Fragm.* 9: 198). A 1912 collection by P.R.H. St John from Bacehus Marsh (MEL 56069) seems to be labeled incorrectly, since the taxon is very unlikely to occur that far from the Grampians. It is not uncommon for St John specimens to have incorrectly ascribed locality information (N.G. Walsh, pers. comm.).

Typification: Four sheets at MEL are marked as possible syntypes, three of which bear the label "Mt. Difficult, Grampians" and were collected by Audas and D'Alton in October 1919. The lectotype (MEL 56153) is a flowering branch. The remaining isoelectotypes consist of a vegetative specimen (MEL 56154) and two small flowering twigs (MEL 56156).

The correspondence between Tadgell and Audas is attached to sheet MEL 688397, which contains two flowering branchlets and has clearly been used to draw up the diagnosis of the species. The sheet is from Tadgell's own herbarium (a corresponding specimen of *S. daltonii*, MEL 688389, from his herbarium has a copy of the letters from 8 Feb. 1921 attached as well). The sheet is only annotated "Grampians 1920" and "from Audas Feb. 1921", which is in conflict with the date of the other isoelectotypes. Helen Aston (in a note on the sheet, dated May 1987) assumes that the specimens are "probably part of the Oct. 1919 type gathering" since "Audas frequently used dates conflicting by a year or two". This assumption is corroborated by Audas' assertion that he and D'Alton were "unable to secure the smallest specimen" (Audas 1921a: 16) of *S. daltonii* during his October 1920 field trip to the Grampians. As such, the specimen could not have been gathered in 1920, but presumably the year before. Although used by Tadgell and Audas to compile the original description of the species, this sheet is not selected as the lectotype because of the lack of exact information about the collectors, location and date.

According to the label, the specimen in J.M. Black's herbarium (AD 97611150) was collected by Audas only, and not by Audas and D'Alton, as stated in the protologue. It is therefore not accepted as type material.

Discussion

The molecular systematic analysis of Kellermann *et al.* (2005) confirmed both genera, *Trymalium* and *Spyridium*, with high statistical support. The *Trymalium* clade comprised species from Western Australia and South Australia only, and was sister to the remaining genera of Pomaderreae, although this position within the tribe did not receive any statistical support above 50%. The genus *Spyridium* consisted of four subclades, containing taxa from Western Australia, Tasmania, south-eastern Australia and New South Wales. *Spyridium daltonii* and *S. xramosissimum* formed a highly supported clade, which was firmly placed within the genus *Spyridium* in the clade of south-eastern

Australian species. Chloroplast *trnL-F* sequence data also confirms the placement of these species (unpubl. results). As such the generic placement of *Spyridium daltonii* and *S. xramosissimum* in *Spyridium* is unambiguous when using molecular data.

Thiele and West (2004) have published diagnostic characters for *Spyridium* that have helped to clarify its generic limits and relationships to other Australian genera of Rhamnaceae. Some of the main features mentioned by the authors are the type of disc, inflorescence and disseminule, which are all discussed below for *S. daltonii* and *S. xramosissimum*. Diagnostic differences between *Spyridium* and *Trymalium* are listed in Table 1.

Table 1: Diagnostic differences between the genera *Spyridium* and *Trymalium*

<i>Spyridium</i>	<i>Trymalium</i>
Stipules	
Persistent, free or connate behind petiole	Deciduous, free, sometimes overlapping behind petiole
Inflorescences	
Cymose, the cymose pattern \pm maintained to the base of the inflorescence	Cymose, the unit-cymes usually arranged racemously on little-branched axes, which are often grouped into higher-order panicles, rarely umbellate
Floral leaves	
Often present with a dense white indumentum on the upper leaf surface, subtending the unit-cymes or the whole inflorescence	Absent
Pedicels	
Absent or apparently so	Clearly pedicellate
Floral bracts	
Generally large, persistent, surrounding the flower heads or unit-cymes	Thin, stipule-like, caducous, at the base of the unit-cymes
Flower colour	
White to grey	Beige to yellow
Free hypanthium tube	
Usually very short (but see Thiele & West 2004 for exceptions)	Usually absent, except <i>T. urceolare</i> (F. Muell.) Diels
Petals	
Cucullate, hooding and enclosing the anthers, usually erect	Longitudinally rolled or \pm flattened, spatulate, usually spreading
Style	
Entire with a minutely 3-lobed stigma	Deeply branched, (2)3-fid
Disc	
Glabrous, shelf-like, attached to the hypanthium wall, indented adjacent to the staminal filaments, sometimes consisting of distinct lobes	Glabrous, thickened ring immediately surrounding the ovary, indented adjacent to the staminal filaments
Disseminule	
Indehiscent fruitlets, the wall thin and papery, often \pm translucent, and covered with a crystal layer	Indehiscent fruitlets, the wall hard, bony, corrugate and often resinous on the inner surface

Flowers in *Spyridium* are usually smaller than those in *Trymalium* and are arranged in loose or dense, compound-cymose inflorescences with cymose bracts; the cymose pattern is maintained to the base of the inflorescence. In some species the cyme branching is highly contracted, resulting in dense, head-like inflorescences. Inflorescence-units in *Spyridium* are often subtended by floral leaves, which are covered with a conspicuous, showy, white indumentum. Flowers in species of *Trymalium* are more loosely arranged, with unit-cymes of the inflorescence often grouped racemously on little-branched axes, which are frequently arranged into higher-order panicles. Floral leaves are absent in *Trymalium*.

Spyridium daltonii and *S. xamosissimum*, both have inflorescences with a clearly maintained cymose pattern throughout, as is illustrated for *Spyridium* in Thiele and West (2004, Tab. 1). The inflorescences are more open than in typical species of *Spyridium*, and the peduncles of the unit-cymes are elongated [a situation that also occurs in other species, e.g., *S. gunnii* (Hook. f.) Benth. and *S. globulosum* (Labill.) Benth.]. This loose arrangement of flowers might have been one reason for Mueller to place *S. daltonii* into *Trymalium*. The actual flowers, however, are \pm sessile. Some flowers in *S. daltonii* appear to be pedicellate, but these are better interpreted as one-flowered unit-inflorescences, since each flower is immediately subtended by 2–3 cymose bracts. Flowers in *Trymalium* have a true pedicel with the cymose bracts located at the base.

Spyridium flowers have a short, free hypanthium tube and a glabrous, shelf-like disk attached high on the hypanthium wall and notched adjacent to the staminal filaments (see Thiele & West 2004). A free hypanthium tube is absent in all species of *Trymalium*, with the exception of *T. urceolare* (F. Muell.) Diels (Rye 1995). The disc in *Trymalium* consists of a glabrous, thickened ring that immediately surrounds the ovary and is also indented adjacent to the staminal filaments. The two species from the Grampians have a spyridioid disc, and a very short hypanthium tube. Similarly, all species of *Trymalium* have a deeply branched style and more or less flattened petals, whereas the two Victorian species have an undivided, 3-lobed style and distinctly cucullate petals, both of which are characters typical for *Spyridium*.

The fruit in both genera is similar. Rye considers the genera *Trymalium* and *Spyridium* to be closely related on the basis of shared fruit characters, namely the presence of “indehiscent fruitlets that are released with their enclosed seed when the schizocarp dehisces” (Rye 1995: 119–120). The texture of the disseminule, the fruitlet, is an important difference between the two genera. The walls of the fruitlets of *Spyridium* are papery and covered with a crystal layer, whereas in *Trymalium* it is hard with a corrugated and often resinous inner surface. The fruits of *S. daltonii* consist of indehiscent fruitlets that have a crystal layer between the fruitlet wall and the hypanthium wall. The texture of the fruitlet wall is somewhat tougher than usually in *Spyridium*, but not as indurate as in *Trymalium*. The fruitlets are finely corrugated on the inner surface, but not resinous. As such, they appear superficially similar to fruitlets in *Trymalium*. The fruitlets contain a seed with a very small basal, yellow, translucent aril. *S. xamosissimum* does not produce mature fruits (see above).

Thiele and West (2004: 827) described the seeds of *Spyridium* as “lacking an aril”. This is in error (see also Rye 1995 and Walsh 1999a). Arils in *Spyridium* are rudimentary, very small, easily detached, usually yellow-translucent in colour, and often remain stuck inside the fruitlet when the seed is dissected out. As such, the seed does appear not to have an aril. Arils in *Trymalium* are also small and easily detached.

The morphological characteristics of *S. daltonii* and *S. xamosissimum* clearly place the two species in *Spyridium* and corroborate the results of the molecular analyses. Mueller’s placement of *S. daltonii* in *Trymalium* seems to have been based more on the overall appearance of the plant, i.e., the large shrubby habit, open inflorescences and yellowish flowers. Audas (1921a) recognised that *S. xamosissimum* is closely related to *S. daltonii*. However, he did not examine the generic placement of the two species of

Trymalium in Victoria, despite the fact that the two botanists that he asked for advice on *S. xamosissimmm* did provide him with different opinions on the generic placement of the new species: J.M. Black informed him, that the taxon is a species of *Spyridium*; A.J. Tadgell opted for *Trymalium*.

Key to the species of *Spyridium* in Victoria

The addition of two more species to *Spyridium* makes it necessary to revise the key to the Victorian species in the genus published in the *Flora of Victoria* (Walsh 1999a).

- 1 Leaf tips toothed, notched or deeply cleft, no longer than 12 mm; rare shrubs of Little Desert, Grampians or East Gippsland 2
- 1: Leaves entire or if ever emarginate, at least some longer than 12 mm 3
- 2 Leaves obovate, 3-toothed at apex; margins plane to slightly recurved; leaves all greyish pubescent above and below; Grampians and East Gippsland heaths *S. cinereum*
- 2: Leaves deeply cleft, Y-shaped; margins strongly recurved; normal leaves glabrescent on upper surface; southern fringes of Little Desert *Spyridium* sp. 1
- 3 Surfaces of leaves shining from a covering of appressed silky hairs; rare, spindly shrub of southern Big Desert near South Australian Border *S. nitidum*
- 3: Leaves glabrous or pubescent, but not with shining appressed hairs 4
- 4 Floral leaves white-felted, differing from stem leaves (very rarely stem leaves felted in *S. parvifolium*) 5
- 4: Floral leaves not noticeably different from stem leaves, or only sparsely pubescent .. 6
- 5 Leaves orbicular to obovate, usually wrinkled above and with prominent lateral venation; widespread shrub *S. parvifolium*
- 5: Leaves linear to narrow-elliptic, neither wrinkled above nor with prominent lateral venation; shrub of western heaths *S. vexilliferum*
- 6 Leaves linear to narrow elliptic, sharp pointed or mucronate, glabrous; margins revolute, undersurface not visible, but midrib exposed in *S. daltonii* 7
- 6: Leaves oblong to narrowly elliptical or narrowly ovate to narrowly obovate, apex obtuse to acute (but not sharp pointed); margins recurved to revolute but undersurface usually visible 8
- 7 Flowers in dense, terminal, shortly pedunculate heads; leaves strongly revolute, lower surface always hidden; Mallee, also near Bacchus Marsh and Maffra *S. eriocephalum*
- 7: Inflorescence open, in cymose panicles; lower surface of leaves obscured, but midvein visible; Grampians *S. daltonii*
- 8 Leaves oblong or narrowly ovate to narrowly obovate, covered with greyish, fine stellate hairs, at least when young; flowers crowded near branch tips, rarely in sessile, terminal heads; Mallee, north-western Victoria *S. subochreatum*
- 8: Stem leaves narrow elliptic (or broader), upper surface usually glabrous and with impressed lateral veins; floral leaves sometimes covered with sparse indumentum; inflorescence in short, few-flowered panicles; Grampians, normally in areas where *S. parvifolium* and *S. daltonii* are present *S. xamosissimum*

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